

CLAIMS

What is claimed is:

1. A method for mounting an implant at an orthopedic joint, the method comprising:

forming a tunnel through a bone, the tunnel having an open second end on a natural or resected articulating surface of the bone and an open first end at a location on the bone spaced apart from the natural or resected articulating surface;

advancing a fastener into the tunnel from the first end of the tunnel; and

securing the fastener at least partially disposed within the tunnel to an implant disposed over the second end of the tunnel.

2. A method as recited in claim 1, wherein the act of forming the tunnel comprises:

biasing a tubular guide sleeve against the location on the bone that is spaced apart from the natural or resected articulating surface; and

passing a drill tool through the guide sleeve and into the bone so that the drill tool exits the bone on the natural or resected articulating surface.

3. A method as recited in claim 1, wherein the implant comprises a body having an articular surface and an opposing bone apposition surface, a stem projecting from the bone apposition surface, the method further comprising positioning the implant on the natural or resected articulating surface so that a least a portion of the stem is received within the second end of the tunnel.

4. A method as recited in claim 1, wherein the act of advancing the fastener into the tunnel comprises:

removably securing a driver to the fastener; and
using the driver to advance the fastener into the tunnel.

5. A method as recited in claim 1, further comprising advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone and encircles at least a portion of the fastener secured to the implant.

6. A method as recited in claim 5, wherein the act of advancing the tubular bone anchor comprises advancing the tubular bone anchor over a driver extending from the fastener.

7. A method as recited in claim 5, further comprising securing a crown nut to the fastener so that the crown nut biases against the bone anchor and thereby tensions the fastener.

8. A method as recited in claim 7, further comprising backing the bone anchor a distance back toward the first end of the tunnel so as to further tension the fastener.

9. A method as recited in claim 1, further comprising advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone, the fastener being advanced into the tunnel after placement of the bone anchor such that at least a portion of the fastener passes through the bone anchor.

10. A method as recited in claim 1, wherein the act of forming a tunnel comprises forming the tunnel at a distal end of a femur.

11. A method as recited in claim 1, wherein the act of forming a tunnel comprises forming the tunnel on a humerus.

12. A method for mounting an implant at an orthopedic joint, the method comprising:

positioning a distal end of a fastener at a select location of a bone, the select location being spaced apart from a natural or resected articulating surface of the bone;

advancing the fastener from the select location such that the distal end of the fastener passes through the bone and exits through the natural or resected articulating surface of the bone; and

securing the fastener at least partially disposed within the bone to an implant such that the implant covers at least a portion of the natural or resected articulating surface of the bone.

13. A method as recited in claim 12, wherein the act of advancing the fastener comprises driving or screwing the fastener directly through the bone without forming a prior tunnel.

14. A method as recited in claim 12, further comprising:

forming a tunnel through a bone, the tunnel having an open second end on the natural or resected articulating surface of the bone and an open first end at the select location spaced apart from a natural or resected articulating surface of the bone; and

the act of advancing the fastener comprising advancing the fastener through the tunnel.

15. A method as recited in claim 12, further comprising resecting an articulating surface of the bone prior to advancing the fastener.

16. A method as recited in claim 12, further comprising positioning the implant at the proximal end of a femur or the distal end of a femur prior to the act of securing the fastener.

17. A method as recited in claim 12, further comprising positioning the implant at the proximal end of a tibia or the distal end of a tibia prior to the act of securing the fastener.

18. A method as recited in claim 12, further comprising advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone and encircles at least a portion of the fastener secured to the implant.

19. A method as recited in claim 18, further comprising securing a crown nut to the fastener so that the crown nut biases against the bone anchor and thereby tensions the fastener.

20. A method as recited in claim 19, further comprising backing the bone anchor a distance back toward the first end of the tunnel so as to further tension the fastener.

21. A method as recited in claim 12, further comprising advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone, the fastener being advanced into the tunnel after placement of the bone anchor such that at least a portion of the fastener passes through the bone anchor.

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22. A method for mounting an implant at an orthopedic joint, the method comprising:

securing a distal end of a fastener to an implant, the implant being disposed over a natural or resected articulating surface of a bone, the fastener extending through a portion of the bone so that the a proximal end of the fastener is accessible from a select location spaced apart from the natural or resected articulating surface of the bone; and

selectively tensioning the fastener through manipulations performed at the proximal end of the fastener so as to adjust a force at which the implant bears against the natural or resected articulating surface of the bone.

23. A method as recited in claim 22, wherein the act of selectively tensioning the fastener comprises rotating the fastener so that the fastener biases against the bone.

24. A method as recited in claim 22, wherein the act of selectively tensioning the fastener comprises comprising advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone and encircles at least a portion of the fastener secured to the implant.

25. A method as recited in claim 24, further comprising securing a crown nut to the fastener so that the crown nut biases against the bone anchor and thereby tensions the fastener.

26. A method as recited in claim 25, further comprising backing the bone anchor a distance back toward the first end of the tunnel so as to further tension the fastener.

27. A method as recited in claim 22, further comprising advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone, the fastener being advanced into the tunnel after placement of the bone anchor such that at least a portion of the fastener passes through the bone anchor.

28. A method as recited in claim 22, further comprising positioning the implant at the proximal end or distal end of a femur, tibia, humerus, radius, or ulna.

29. A method for mounting an implant at an orthopedic joint, the method comprising:

forming a tunnel through a bone, the tunnel having an open second end on a natural or resected articulating surface of the bone and an open first end at a location on the bone spaced apart from the natural or resected articulating surface;

positioning an implant on the natural or resected articulating surface such that an elongated fastener projecting from the implant is advanced into the tunnel from the second end of the tunnel as the implant is being positioned on the natural or resected articulating surface; and

advancing a structure into the tunnel from the first end of the tunnel so as to secure the fastener within the tunnel.

30. A method as recited in claim 29, wherein the fastener is connected to or is integrally formed with the implant.

31. A method as recited in claim 29, wherein the act of positioning an implant comprising positioning the implant at a proximal end or distal end of a femur, tibia, humerus, radius, or ulna.

32. A method as recited in claim 29, wherein the act of advancing a structure into the tunnel comprises advancing a tubular bone anchor into the tunnel from the first end of the tunnel so that the bone anchor engages with the bone and encircles at least a portion of the fastener projecting from the implant.

33. A method as recited in claim 32, further comprising securing a crown nut to the fastener so that the crown nut biases against the bone anchor and thereby tensions the fastener.

34. A method as recited in claim 33, further comprising backing the bone anchor a distance back toward the first end of the tunnel so as to further tension the fastener.

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35. An implant for resurfacing at least a portion of an articulating surface of a bone, the implant comprising:

a body having a first side with top articular surface and an opposing second side with a bone apposition surface, the bone apposition surface being adapted to bias against a natural or resected articulating surface of a bone; and

means for securing a fastener to the second side of the body after the bone apposition surface is biased against the natural or resected articulating surface such that applying increased tension to the fasten increases a force at which the bone apposition surface biases against the natural or resected articulating surface.

36. An implant as recited in claim 35, wherein the means for securing a fastener comprises a socket formed on the bone apposition surface of the body.

37. An implant as recited in claim 36, wherein the socket is threaded.

38. An implant as recited in claim 35, wherein the means for securing a fastener comprises a stem outwardly projecting from the bone apposition surface of the body.

39. An implant as recited in claim 38, wherein the stem has a socket formed thereon.

40. An implant as recited in claim 38, wherein the stem has threads formed thereon.

41. An implant as recited in claim 38, wherein the stem has a central longitudinal axis and the stem is oriented so as to form an angle between the central longitudinal axis of the stem and the bone apposition surface of the body in a range between about 30° to about 80°.

42. An implant as recited in claim 38, wherein the stem has a length in a range between about 2 mm to about 6 mm.

43. An implant as recited in claim 35, wherein the body comprises:

a tray having the bone apposition surface; and

a bearing plate mounted on the tray, the bearing plate being comprised of a polymeric material and having the top articular surface.

44. An implant as recited in claim 35, wherein the implant comprises a femoral or tibial implant.

45. An implant as recited in claim 35, wherein the body comprises:

a lower bearing plate; and

an upper bearing plate having the top articular surface formed thereon,
one of the lower bearing plate and upper bearing plate having a track formed
thereon while the other has a key that slidably rides within the track.

46. An implant as recited in claim 35, wherein the body comprises:

a bearing plate having the top articular surface and an opposing bottom
surface, a pocket being formed on the bottom surface of the bearing plate; and

an inlay of porous bone ingrowth material secured within the pocket.

47. An implant as recited in claim 46, wherein the means for securing the
fastener comprises a stem outwardly projecting from the bottom surface of the bearing
plate, the inlay encircling the stem.

48. An implant as recited in claim 35, wherein the body comprises a first
part and a second part that can be selectively connected together, each of the first part
and the second part comprising a portion of the top articular surface and the bone
apposition surface.

49. An implant system for resurfacing at least a portion of an articulating surface of a bone, the system comprising:

an implant having a top articular surface and an opposing bone apposition surface;

an elongated fastener selectively mountable to the implant so as to outwardly project from the bone apposition surface; and

a tubular bone anchor adapted to encircle at least a portion of the fastener.

50. An implant system as recited in claim 49, wherein the implant further comprises a stem projecting from the bone apposition surface, the stem being configured to mate with the fastener.

51. An implant system as recited in claim 49, wherein the implant has a socket formed on the bone apposition surface, the socket being configured to mate with the fastener.

52. An implant system as recited in claim 49, wherein the implant comprises:

a lower bearing plate; and

an upper bearing plate having the top articular surface formed thereon, one of the lower bearing plate and upper bearing plate having a track formed thereon while the other has a key that slidably rides within the track.

53. An implant system as recited in claim 49, wherein the implant comprises:

a tray having the bone apposition surface; and

a bearing plate mounted on the tray, the bearing plate being comprised of a polymeric material and having the top articular surface.

54. An implant system as recited in claim 49, wherein the implant comprises:

a bearing plate having the top articular surface and an opposing bottom surface, a pocket being formed on the bottom surface of the bearing plate; and

an inlay of porous bone ingrowth material secured within the pocket.

55. An implant system as recited in claim 49, wherein the body comprises a first part and a second part that can be selectively connected together, each of the first part and the second part comprising a portion of the top articular surface and the bone apposition surface.

56. An implant system as recited in claim 49, wherein the fastener comprises an elongated shaft having a length in a range between about 5 mm to about 15 mm.

57. An implant system as recited in claim 49, wherein the fastener comprises an elongated shaft having an enlarged head integrally formed thereon.

58. An implant system as recited in claim 49, further comprising an enlarged crown nut removably mountable to the fastener.

59. An implant system as recited in claim 49, wherein the bone anchor comprises one or more threads or barbs formed on an exterior surface thereof.

60. A implant system as recited in claim 49, wherein the fastener has at least one helical thread that engages with the implant and the bone anchor has at least one external helical thread, the helical thread of the bone anchor rotating in a direction opposite of the helical thread of the fastener.

61. An implant system as recited in claim 49, wherein the bone anchor has an interior surface bounding a channel extending between a first end and an opposing second end, the first end terminating at a first end face, the channel comprising a first channel portion extending from the first end, a second channel portion extending from the second end, and a radially inwardly projecting shoulder disposed between the first channel portion and the second channel portion.

62. An implant system as recited in claim 61, wherein the fastener comprises a shaft having an enlarged head integrally formed thereon, the head being biased against the shoulder of the bone anchor.

63. An implant system as recited in claim 61, further comprising an enlarged crown nut removably mounted on the fastener and biased against the shoulder of the bone anchor.

64. An implant system as recited in claim 49, further comprising a drive rod integrally formed with the fastener, a plurality of spaced apart annular breaking grooves being formed at the intersection between the fastener and the drive rod.

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65. A method for resecting at least a portion of an articulating surface of a bone, the method comprising:

forming a tunnel through a section of a bone, the tunnel having an open second end on an articulating surface of the bone and an open first end at a location on the bone spaced apart from the articulating surface;

advancing a first end of a retention rod from the first end of the tunnel to the second end of the tunnel; and

engaging a first rasp to the first end of the retention rod; and

moving at least the first rasp or the retention rod so as to cause the first rasp to resect at least a portion of the articulating bearing surface of the bone.

66. A method as recited in claim 65, wherein the act of forming the tunnel comprises:

biasing a tubular guide sleeve against the location on the bone spaced apart from the articulating surface; and

passing a drill tool through the guide sleeve and into the tibia so as to form the tunnel.

67. A method as recited in claim 65, wherein the rasp comprises a rasp body having a pivot arm hingedly mounted thereto, the act of engaging the first rasp to the first end of the retention rod comprising:

securing an insertion handle to the rasp body; and

using the insertion handle to place the rasp body onto the lateral or medial facet of the tibia.

68. A method as recited in claim 67, wherein the act of moving at least the first rasp or the retention rod comprises:

removing the insertion handle from the rasp body; and
mounting a reciprocating driver to the pivot arm.

69. A method as recited in claim 65, wherein the first rasp comprises a rasp body having a rasp guide slidably mounted thereto, the act of engaging the first rasp to the first end of the retention rod comprising connecting the retention rod to the rasp guide.

70. A method as recited in claim 65, further comprising:

disengaging the retention rod from the first rasp; and
engaging the retention rod with a second rasp, the second rasp having a configuration different than the first rasp.

71. A method for resecting at least a portion of an articulating surface of a bone, the method comprising:

forming a tunnel through a section of a bone, the tunnel having an open second end on an articulating surface of the bone and an open first end at a location on the bone spaced apart from the articulating surface;

positioning a first cutting template on the articulating surface of the bone;

advancing a first end of a retention rod from the first end of the tunnel to the second end of the tunnel; and

engaging the retention rod extending through the tunnel to the first cutting template at a first location on the first cutting template so as to secure the first cutting template on the articulating surface of the bone.

72. A method as recited in claim 71, wherein the retention rod comprises a tubular set rod and a hook rod movably disposed within the set rod, the act of engaging the retention rod to the first cutting template comprising:

connecting the hook rod to the first cutting template; and

biasing the set rod against the first cutting template so as to tension the hook rod.

73. A method as recited in claim 71, wherein the first cutting template at least partially bounds a guide space extending through the first cutting template, the method further comprising resecting at least a first portion articulating surface of the bone exposed in alignment with the guide space of the first cutting template.

74. A method as recited in claim 73, wherein the act of resecting comprises at least scraping, drilling, burring, or chiseling the first portion of the lateral or medial facet of the tibia.

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75. A system for resecting at least a portion of an articulating surface of a bone, the system comprising:

a rasp body having a surface with a plurality of cutting edges, the rasp body being adapted for placement on an articulating surface of a bone;

an elongated retention rod; and

means for removably engaging the retention rod with the rasp body such that the rasp body can be selectively reciprocated without substantial movement of the retention rod.

76. A system as recited in claim 75, wherein the rasp body comprises a plate having a bottom surface with the cutting edges formed thereon, the bottom surface of the plate being arched so as to be convex.

77. A system as recited in claim 75, wherein the means for removably engaging the retention rod with the rasp body comprises:

a rasp guide slidably mounted on the rasp body such that at least a portion of the rasp guide projects from or is accessible through the bottom surface of the rasp body; and

the retention rod is configured to engage with the rasp guide.

78. A system as recited in claim 75, wherein the means for removably engaging the retention rod with the rasp body comprises:

a slide plate slidably mounted on the rasp body;

a pair of spaced apart forks projecting from the slide plate so as to extend beyond the bottom surface of the rasp body;

a pin extending between the spaced apart forks; and

a hook formed on the end of the retention rod, the hook being configured to hook over the pin.

79. A system as recited in claim 75, wherein the retention rod comprises:

a tubular set rod; and

a hook rod disposed within the tubular set rod.

80. A system as recited in claim 75, wherein the rasp body has concave cutting surface with the cutting edges formed thereon.

81. A system for resecting at least a portion of an articulating bearing surface of a bone, the bone having a tunnel with an open distal end at the articulating bearing surface and a proximal end at a location spaced apart from the articulating bearing surface, the system comprising:

a first resecting template at least partially bounding a first guide space extending through the first resecting template, the first resecting template being adapted for placement on the articulating bearing surface of the bone such that the first guide space is aligned with at least a first portion of the articulating bearing surface to be resected;

a retention rod adapted to fit within the tunnel formed on the bone; and

means for removably engaging the retention rod to the first cutting template so that the retention rod secures the first cutting template to the articulating bearing surface of the bone when the retention rod is received within the tunnel on the bone.

82. A guide assembly for forming a tunnel through a bone, the guide assembly comprising:

a brace having a first end and an opposing second end;

a template mounted on the first end of the brace, the template being adapted to rest on an articulating surface of the bone; and

a tubular guide sleeve having a proximal end and an opposing distal end, the tubular guide sleeve being adjustably mounted on the second end of the brace such that when the template is disposed on the articulating surface of the bone, the distal end of the tubular guide sleeve can be selectively biased against the bone at a location spaced apart from the articulating surface.

83. A guide assembly as recited in claim 82, further comprising a plurality of alternative templates each having a different configuration, the template being selected from the plurality of alternative templates.

84. A guide assembly as recited in claim 82, wherein the tubular guide sleeve has a central longitudinal axis that intersects with the template.

85. A guide assembly as recited in claim 82, further comprising:

a tubular drill sleeve slidably disposed within the tubular guide sleeve;

and

a guide wire rotatably disposed within the tubular drill sleeve.

86. A method for forming a tunnel through a section of a bone, the method comprising:

positioning a template on a natural or resected articulating surface of a bone;

securing a tubular guide sleeve against the bone at a location spaced apart from the natural or resected articulating surface of the bone; and

using the guide sleeve as a guide, drilling a tunnel having a first end at the location spaced apart from the natural or resected articulating surface and a second end on the natural or resected articulating surface.

87. A method as recited in claim 86, wherein the act of positioning the template comprises test fitting a plurality of alternative templates on the natural or resected articulating surface, each alternative template having an alternative configuration, the template being selected from the alternative templates.

88. A method as recited in claim 86, wherein the template is mounted to a brace, the method further comprising selectively adjusting the position of the template relative to the brace based on the desired position for the tunnel.

89. A method as recited in claim 86, wherein the tubular guide sleeve has a central longitudinal axis, the act of securing a tubular guide sleeve comprising aligning the guide sleeve so that the central longitudinal axis of the guide sleeve intersects with the template.

90. A method as recited in claim 86, wherein the act of drilling the tunnel comprises:

positioning a drill tool within the tubular guide sleeve; and

advancing the drill tool through the bone so that the drill tool contacts the template.

91. A method as recited in claim 86, wherein the drill tool comprises a guide wire or drill bit.

92. An implant system for resurfacing at least a portion of an articulating surface of a bone, the system comprising:

an implant having a top articular surface and an opposing bone apposition surface;

an elongated fastener having a proximal end and an opposing distal end, the distal end being permanently or selectively mounted to the implant so that the fastener outwardly project from the bone apposition surface; and

a nut removably mounted to the proximal end of the fastener.

93. An implant system as recited in claim 92, further comprising a bone anchor encircling at least a portion of the fastener.